

I claim:

1. An ionically conductive ceramic element comprising: 40
  - a plurality of tubes each having interior and exterior surfaces, and each having a closed end and an open end;
  - a tube support member receiving open ends of said plurality of tubes; 45
  - a first electrically conductive coating covering said exterior surfaces of said plurality of tubes;
  - a second electrically conductive coating covering said interior surfaces of said plurality of tubes; and 50
  - said ionically conductive ceramic element having at least two columns and a first electrode covering an exterior surface of said first column and an interior surface of said second column of tubes and a second electrode covering an exterior surface of said second column of tubes and an interior surface of said first column of tubes; 55
- said first electrode being connectable to a source of electrical potential at a first polarity and said second electrode being connectable to a source of electrical potential at a second polarity. 60
2. The ceramic element described in claim 1 wherein said plurality of tubes are formed into rows and columns on said tube support member wherein each tube is connected to said first electrode and said second electrode and first and second electrode portions of each of said tubes in a column are electrically connected in parallel and wherein each of the tubes forming a row are electrically connected in series.
3. The ceramic element described in claim 2 wherein said 5 first and second electrodes are formed by
  - cuts in said first and second electrically conductive coatings between said columns of tubes, said cuts extending longitudinally of and between the columns of tubes so that the portions of said first and second electrodes on opposite sides of each said cut are electrically separated, vias extended through said first and second surfaces adjacent each of said tubes and 10
  - electrical connections extending through said vias connecting a first electrode portion of each said tube in a row to a second electrode portion of a tube in an adjacent column in the same row to form a series connection across each row of tubes. 15
4. The ceramic element described in claim 3 wherein said 20 electrical connections are constituted by the material forming said first and second electrodes coating the surfaces of said ceramic electrolyte extending through said vias.
5. The ceramic element described in claim 1, wherein each the plurality of tubes is spaced from adjacent tubes.
- 25 6. An oxygen generator, comprising:
  - a first ceramic element having a tube support member and an array of tube members extending from said tube support member and formed into columns and rows;
  - a second ceramic element adjacent said first ceramic element; and 30
  - a seal between said first ceramic element and said second ceramic element;

- 35 said first ceramic element having at least two columns and  
a first electrode covering an exterior surface of said first  
column and an interior surface of said second column  
of tubes and a second electrode covering an exterior  
surface of said second column of tubes and an interior  
surface of said first column of tubes;
- 40 said first electrode being connectable to a source of  
electrical potential at a first polarity and said second  
electrode being connectable to a source of electrical  
potential at a second polarity.
- 45 7. The oxygen generator of claim 6, wherein said first  
ceramic element includes a first electrically conductive  
coating covering exterior surfaces of each of said plurality of  
tube members; and
- 50 wherein said first ceramic element includes a second  
electrically conductive coating covering interior sur-  
faces of said plurality of tube members.
8. The oxygen generator of claim 6, wherein said first  
ceramic element is integrally formed.
9. An electrochemical element, comprising:
- 55 a ceramic element having a tube support member and an  
array of tube members extending from said tube sup-  
port member;
- wherein said tube support member and said array of tube  
members are formed from ceramic.
- 60 10. The electrochemical element of claim 9, wherein said  
ceramic element is an electrolyte.
11. The electrochemical element of claim 9, wherein said  
ceramic element is integrally formed.

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